



Operators and Parts Manual

12 and 24 Volt Battery Charger

- Fully Automatic
 - Constant Voltage Output
 - Current Limiting
 - Charges Lead-Acid and Nickel-Cadmium Batteries
- | | |
|------------------|------------------|
| • Models (60 Hz) | • Models (50 Hz) |
| 305-0346 | 305-0706 |
| 305-0347 | 305-0707 |
| 305-0395 | 305-0708 |
| 305-0398 | 305-0709 |



Safety Precautions

The following symbols in this manual highlight conditions potentially dangerous to service personnel, or equipment. Read this manual carefully. Know when these conditions can exist. Then take necessary steps to protect personnel as well as equipment.

⚠ DANGER *This symbol if used warns of immediate hazards which will result in severe personal injury or death.*

⚠ WARNING *This symbol refers to a hazard or unsafe practice which can result in severe personal injury or death.*

⚠ CAUTION *This symbol refers to a hazard or unsafe practice which can result in personal injury or product or property damage.*

Important safety instructions

Instructions importantes concernant la sécurité

(a) Save these instructions. This manual contains important safety and operating instructions;

a) Conserver ces instructions. Ce manuel contient des instructions importantes concernant la sécurité et le fonctionnement;

(b) Working in the vicinity of a battery is dangerous. Batteries generate explosive gases during normal battery operation. For this reason it is of the utmost importance that each time before using your charger, you read and follow the instructions provided exactly;

b) Il est dangereux de travailler à proximité d'une batterie. Les batteries produisent des gaz explosifs en service normal, aussi est-il important de toujours relire les instructions avant d'utiliser le chargeur et de les suivre à la lettre;

(c) To reduce the risk of battery explosion, follow these instructions and those marked on the battery;

c) Pour réduire le risque d'explosion, lire ces instructions et celles qui figurent sur la batterie;

(d) Never smoke or allow an open spark or flame in the vicinity of the battery or engine;

d) Ne jamais fumer près de la batterie ou du moteur et éviter toute étincelle ou flamme nue à proximité de ces derniers;

(e) Do not use charger to supply power to an extra-low-voltage electrical system or to charge dry-cell batteries. Charging dry-cell batteries can cause them to burst and cause injury to persons and damage to property;

e) Ne pas utiliser le chargeur pour alimenter un réseau électrique très basse tension ni pour charger des piles sèches. Le fait d'utiliser le chargeur pour charger des piles sèches peut entraîner l'éclatement des piles et causer des blessures ou des dommages;

(f) Never charge a frozen battery;

f) Ne jamais charger une batterie gelée;

(g) If necessary to remove battery from generator set battery tray to charge, always remove grounded terminal from battery first. Make sure all switches on the generator set control panel are off in order to prevent an arc;

g) S'il est nécessaire de retirer la batterie du support de générateur pour la charger, toujours débrancher la borne de mise à la masse en premier. S'assurer que tous les interrupteurs du panneau de commande du générateur sont sur arrêt afin d'éviter la formation d'un arc;

(h) Study all battery manufacturer's specific precautions such as removing or not removing cell caps while charging and recommended rates of charge;

h) Prendre connaissance des mesures de précaution spécifiées par le fabricant de la batterie, p. ex. vérifier s'il faut enlever les bouchons des cellules lors du chargement de la batterie, les taux de chargement recommandés;

(i) For a charger having an output voltage selector switch the user is to be instructed to determine the voltage of the battery by referring to the generator set manufacturer's operator's manual and to make sure the output voltage is set at the correct voltage. If an output voltage selector switch is not provided, the user is to be instructed not to use the battery charger unless the battery voltage matches the output voltage rating of the charger;

i) Si le chargeur comporte un sélecteur de tension de sortie, le fabricant doit recommander à l'utilisateur de consulter le manuel de l'utilisateur du fabricant du générateur pour déterminer la tension de la batterie et pour s'assurer que la tension de sortie est appropriée. Si le chargeur n'est pas muni d'un sélecteur, le fabricant doit recommander à l'utilisateur de ne pas utiliser le chargeur à moins que la tension de la batterie ne soit identique à la tension de sortie nominale du chargeur;

(j) Never place the charger directly above or below the battery being charged; gases or fluids from the battery will corrode and damage charger. Locate the charger as far away from the battery as the DC cables permit;

j) Ne jamais placer le chargeur directement sous la batterie à charger ou au-dessus de cette dernière. Les gaz ou fluides qui s'échappent de la batterie peuvent entraîner la corrosion du chargeur ou l'endommager. Placer le chargeur aussi loin de la batterie que les câbles c.c. le permettent;

(k) Do not operate charger in a closed-in area or restrict ventilation in any way;

k) Ne pas faire fonctionner le chargeur dans un espace clos et/ou ne pas gêner la ventilation;

(l) Connect and disconnect DC output clips only after setting any charger switches to off position and removing AC cord from electric outlet. Never allow clips to touch each other;

l) Mettre les interrupteurs du chargeur hors circuit et retirer le cordon c.a. de la prise avant de mettre et d'enlever les pinces du cordon c.c.. S'assurer que les pinces ne se touchent pas;

(m) Follow these steps when battery is installed in a set mounted battery tray. A spark near battery can cause battery explosion. To reduce risk of a spark near battery:

m) Suivre les étapes suivantes lorsque la batterie se trouve dans un support de batterie incorporé. Une étincelle près de la batterie peut provoquer l'explosion de cette dernière. Pour réduire le risque d'étincelle à proximité de la batterie:

(i) Stay clear of fan blades, belts, pulleys, and other parts that can cause injury to persons;

(i) Faire attention aux pales, aux courroies et aux poulies du ventilateur ainsi qu'à toute autre pièce susceptible de causer des blessures;

(ii) Check polarity of battery posts. Positive (Pos, P, +) battery post usually has larger diameter than negative (Neg, N, -) post;

(ii) Vérifier la polarité des bornes de la batterie. Le diamètre de la borne positive (Pos, P, +) est généralement supérieur à celui de la borne négative (Nég, N, -);

(iii) Determine which post of battery is grounded (connected) to the chassis. If negative post is grounded to chassis (as in most vehicles), see item (iv). If positive post is grounded to the chassis, see item (v);

(iii) Déterminer quelle borne est mise à la masse (raccordée au châssis). Si la borne négative est raccordée au châssis (comme dans la plupart des cas), voir le point (iv). Si la borne positive est raccordée au châssis, voir le point (v);

(iv) For negative-grounded generator set, connect positive (red) clip from battery charger to positive (Pos, P, +) ungrounded post of battery. Connect negative (black) clip to engine block away from battery. Do not connect clip to carburetor, fuel lines, or sheet-metal body parts. Connect to a heavy gauge metal part of the engine block;

(iv) Si la borne négative du générateur est mise à la masse, raccorder la pince positive (rouge) du chargeur à la borne positive (Pos, P, +) non mise à la masse de la batterie. Raccorder la pince négative (noire) au bloc moteur, loin de la batterie. Ne pas raccorder la pince au carburateur, aux canalisations d'essence ni aux pièces de carrosserie en tôle. Raccorder à une pièce métallique de forte épaisseur, sur le bloc moteur;

(v) For positive-grounded generator set, connect negative (black) clip from battery charger to negative (Neg, N, -) ungrounded post of battery. Connect positive (red) clip to engine block away from battery. Do not connect clip to carburetor, fuel lines, or sheet-metal body parts. Connect to a heavy gauge metal part of the engine block;

(v) Si la borne positive du générateur est mise à la masse, raccorder la pince négative (noire) du chargeur à la borne négative (Nég, N, -) non mise à la masse de la batterie. Raccorder la pince positive (rouge) au bloc moteur, loin de la batterie. Ne pas raccorder la pince au carburateur, aux canalisations d'essence ni aux pièces de carrosserie en tôle. Raccorder à une pièce métallique de forte épaisseur, sur le bloc moteur;

(vi) Connect charger AC supply cord to electric outlet;

(vi) Brancher le cordon d'alimentation c.a. du chargeur à une prise électrique;

(vii) When disconnecting charger, turn switches to off, disconnect AC cord, remove clip from engine block, and then remove clip from battery terminal;

(vii) Pour interrompre l'alimentation du chargeur, mettre les interrupteurs hors circuit, retirer le cordon c.a. de la prise, enlever la pince raccordée au bloc moteur et en dernier lieu celle raccordée à la batterie.

(n) Follow these steps when battery is outside generator set. A spark near battery can cause battery explosion. To reduce risk of a spark near battery:

(n) Suivre les étapes suivantes lorsque la batterie est à l'extérieur du générateur. Une étincelle près de la batterie peut provoquer l'explosion de cette dernière. Pour réduire le risque d'étincelle à proximité de la batterie:

(i) Check polarity of battery posts. Positive (Pos, P, +) battery post usually has a larger diameter than negative (Neg, N, -) post;

(i) Vérifier la polarité des bornes de la batterie. Le diamètre de la borne positive (Pos, P, +) est généralement supérieur à celui de la borne négative (Nég, N, -);

(ii) Attach at least a 24-inch (610 mm) long, 6-gauge (AWG) insulated battery cable to negative (Neg, N, -) battery post;

(ii) Raccorder un câble de batterie isolé N°6 AWG mesurant au moins 24 pouces (610 mm) de longueur à la borne négative (Nég, N, -) de la batterie;

(iii) Connect positive (red) charger clip to positive (Pos, P, +) post of battery;

(iii) Raccorder la pince positive (rouge) à la borne positive (Pos, P, +) de la batterie;

(iv) Position yourself and free end of cable as far away from battery as possible, then connect negative (black) charger clip to free end of cable;

(iv) Se placer et tenir l'extrémité libre du câble aussi loin que possible de la batterie puis raccorder la pince négative (noire) du chargeur à l'extrémité libre du câble;

(v) Do not face battery when making final connection;

(v) Ne pas se placer face à la batterie pour effectuer le dernier raccordement;

(vi) Connect charger AC supply cord to electric outlet;

(vi) Raccorder le cordon d'alimentation c.a. du chargeur à la prise électrique;

(vii) When disconnecting charger, always do so in reverse sequence of connecting procedure and break first connection while as far away from battery as practical.

(vii) Pour interrompre l'alimentation du chargeur, toujours procéder dans l'ordre inverse de la procédure de branchement et défaire la première connexion en se tenant aussi loin que possible de la batterie.

FEATURES

The Onan SCR battery float charger is a fully automatic, constant voltage current limiting charger with a built-in equalize charge timer. When the charger is used for stationary service, the permanently connected battery floats at a constant voltage. As the battery approaches the pre-set full charge voltage, charging current automatically tapers to zero. This feature keeps batteries fully charged with no gassing and no overcharging.

For faster charging in portable service or to equalize charge the floating battery, a higher charging voltage can be obtained by switching on the equalize charge timer. Turning the timer raises the charger output voltage for the selected time interval (0 to 12 hours). At the end of the charging period, the timer automatically switches back to the float voltage.

Another feature includes special circuitry to protect the charger from possible damages due to shorted output leads, reversed battery connections, and overload currents. The SCR battery charger may be used for both lead-acid and nickel-cadmium batteries.

INSTALLATION

The metal charger cabinet can be mounted on the wall using the four mounting brackets (one on each corner of the cabinet) or set on a bench using the four rubber feet. Install the battery charger in a location where it is protected from moisture, dust, dirt, or high ambient temperature conditions (140°F/60°C and above).

Wiring

1. Remove the ground cable of any battery that will connect to the battery charger.
2. Remove the AC power source to which the battery charger will connect.

⚠ WARNING *High AC voltages present an electrical shock hazard that can cause severe personal injury or death. Be sure to remove AC power during the installation procedures.*

3. Install lead wires (not included with charger) for the AC line voltage connections and charger to battery connections. Connect lead wires to the terminal board on the inside backplate as shown in Figure 1.

Also connect a ground wire to the grounding stud at the bottom of the charger cabinet.

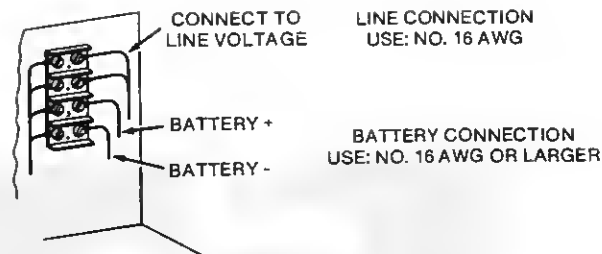


FIGURE 1. BATTERY CHARGER TERMINAL BLOCK FOR LINE AND BATTERY CONNECTIONS

Use 16 AWG wire for the line connections and 16 AWG or larger for the battery connections. Route the lead wires through the knockout hole in the bottom of the chassis.

4. The battery charger is wired at the factory for 120 volt AC (input) operation. To operate at 208 or 240 volts AC (input), change the lead wire connections to the power transformer (T1) as shown in Figure 2.

The exception is 480 volt chargers that have single voltage input suitable for inputs in the range of 440 to 480 volts AC.

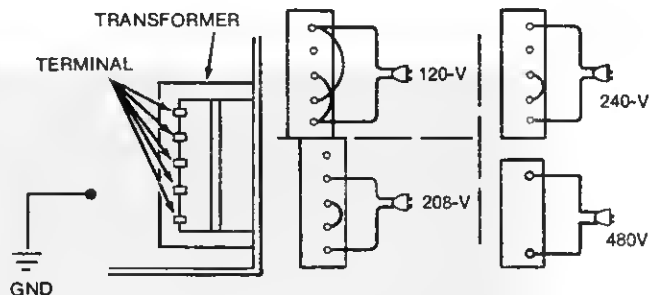


FIGURE 2. BATTERY CHARGER POWER TRANSFORMERS

OPERATION

The battery charger can be operated as a stationary or portable unit for charging either lead-acid or nickel-cadmium batteries. The electronic voltage sensor checks the battery voltage after every half cycle. If the battery voltage is below the reference voltage level, the sensor turns on the silicon controlled rectifier to supply charging current from the full wave bridge rectifier. The charge rate tapers to zero current as the battery becomes fully charged. The charger may be connected on a continuous basis to maintain the battery in a fully charged condition.

Discharged battery must provide a minimum of 4 volts to allow charger to operate properly.

Modes of Operation

The charger has two modes of operation: (1) equalize charge, and (2) float charge. The manually set equalize charge timer (Figure 3) raises the charger output voltage for a selected time period up to 12 hours. The charger returns to float charge at the end of the selected time period.

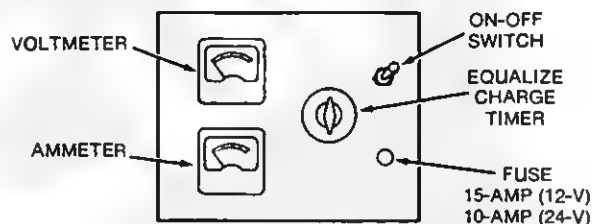


FIGURE 3. BATTERY CHARGER
FRONT PANEL COMPONENTS

Controls

ON-OFF Switch: De-energizes both the AC and DC circuits of the charger.

Equalize Charge Timer: Use to rapidly charge batteries or to equalize charge the battery. Timer can be set for up to 12 hours.

DC Ammeter: Indicates the charger output current.

DC Voltmeter: Indicates the terminal voltage of the battery.

Fuse: Replaceable tubular type fuse protects the transformer and rectifier circuits from excessive overloads (15 amperes for 12 volt, 10 amperes for 24 volts).

SPECIFICATIONS

DC VOLTAGE OUTPUT		12 VOLT	24 VOLT
MODEL	120-208-240 VAC	305-0347/-0707	305-0346/-0706
NO.	440-480 VAC	305-0395/0709	305-0398/0708
Available Input VAC		120-480	120-480
Output Amp, DC		10	6
Regulation		±2%	±2%
DC Voltmeter		0-20	0-40
DC Ammeter		0-10	0-10
Timer (hrs.)		0-12	0-12
Dimensions (in.)		10 x 8 x 8	10 x 8 x 8
Weight (lbs)		23	27

* - Within ±10% line voltage and ±3 Hz of nominal frequency.

Charging Batteries

Plug in the charger to the AC line voltage source (120 through 480 as required). Connect battery lead wires to battery terminals, positive (+) and negative (-) to negative, and turn on charger. The factory adjusts the charger float and equalize voltages to the values shown in Table 1. Refer to the **ADJUSTMENTS** section if any adjustments to the charging voltages are necessary.

Any number of batteries may be connected to the charger. For faster charging, connect two battery chargers together in parallel. The charger with the highest pre-set voltage will control the voltage of the battery.

Turn on equalize charge timer to rapidly charge batteries or to equalize the battery. Most lead-acid battery manufacturers recommend 24 hours of equalize charging each month. Use the equalize charge timer to periodically equalize float charged lead-acid batteries. Nickel-cadmium batteries do not require equalize charging.

TABLE 1. FLOAT/EQUALIZE VOLTAGES

Lead-Acid Batteries		
Battery Voltage	*Float Voltage	Equalize Voltage
12	13.3	14.4
24	26.6	28.8
Nickel-Cadmium Batteries Float Voltage Charge Per Cell		
1.38 to 1.45		
Example: Float charge for 10 cell battery should be 13.8 to 14.5 volts.		

*Voltages shown are for ambient temperatures of 50°F (10°C) to 85°F (30°C). Reduce float voltage by 1% for every 9°F (5°C) above 85°F (29°C). Increase float voltage by 1% for every 9°F (5°C) below 50°F (10°C).

ADJUSTMENTS

Adjust the float and equalize voltages according to the following:

1. Connect charger to a fully charged battery.
2. Connect a high accuracy voltmeter (preferably 1% or better) to the battery terminals.
3. Turn on equalize charge timer and charge battery until it gases.
4. Return timer to zero and wait until voltage stabilizes.
5. If necessary, adjust the float adjustment as follows:

- A. Remove AC power to the battery charger.

⚠ WARNING *High AC voltages present an electrical shock hazard that can cause severe personal injury or death. Make sure to remove AC power input to the battery charger before performing adjustment or service procedures.*

- B. Open battery charger cover to expose the battery charger interior.
- C. Turn the float adjustment potentiometer (Figure 4) counterclockwise to increase float voltage and clockwise to decrease float voltage. Refer to Table 1 for the recommended set voltage.
- D. Close the battery charger and reconnect the AC power.
- E. Wait for the voltage to stabilize before making any additional adjustments. Then make adjustments repeating steps 5a through 5d.

REGULATOR
TERMINAL BOARD

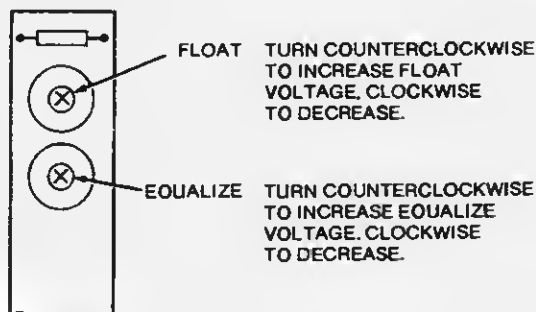


FIGURE 4. FLOAT AND EQUALIZE CHARGE ADJUSTMENTS

6. After the float adjustment is complete, set timer to equalize charge and wait until charge current drops below 5 amperes.
7. If voltage is above the desired equalize voltage (see Table 1), perform the following:

- A. Remove AC power to the battery charger.

⚠ WARNING *High AC voltages present an electrical shock hazard that can cause severe personal injury or death. Make sure to remove AC power input to the battery charger before making any adjustments.*

- B. Open battery charger cover to expose the battery charger interior.
 - C. Turn the equalize-adjust potentiometer clockwise (turn in small amounts, see Figure 4) to decrease the voltage.
 - D. Close the battery charger and reconnect the AC power.
 - E. Wait until battery voltage drops and levels off before making further adjustments. If further adjustments are necessary, repeat steps 7a through 7d.
8. If voltage is below the desired equalize voltage (see Table 1), perform the following:

- A. Remove AC power to the battery charger.

⚠ WARNING *High AC voltages present an electrical shock hazard that can cause severe personal injury or death. Make sure to remove AC power before performing adjustment or service procedures.*

- B. Open battery charger cover to expose the battery charger interior.
 - C. Turn the equalize-adjust potentiometer (Figure 4) counterclockwise (turn in small amounts) to increase voltage. This will also cause the charge current (amperes) to increase.
 - D. Close the battery charger and reconnect the AC power.
 - E. Wait for the charge current to drop and battery voltage to level off before making further adjustments. Then make adjustments repeating steps 8a through 8d.
9. Disconnect the high accuracy voltmeter and return timer to zero for float charging.

TROUBLESHOOTING

POSSIBLE CAUSE	REMEDY
NO DC OUTPUT	
Blown Fuse (F1).	Replace.
Defective Switch (SW1).*	Replace.
Defective Transformer (T2).*	Secondary output voltage at full load should be 13 ± 1.5 volts (12 volt unit), 26 ± 3 volts (24 volt unit), 43.5 volts \pm volt unit).
Defective Rectifier (CR1).*	Use ohmmeter to check each rectifier element (4). Resistance must be high in one direction, low in the other direction. Check between adjacent terminals.
Defective Control Rectifier (SCR).*	Check by replacement.
EQUALIZE CHARGE RATE ONLY	
Defective timer.*	Check that timer contacts close when timer is not operating.
FLOAT CHARGE RATE ONLY	
Defective timer.*	Check that timer contacts close when timer is operating.
Defective Regulator Assy.*	Check by replacement.

* - Have components checked by qualified electronic service personnel.



Onan Corporation
1400 73rd Avenue N. E.
Minneapolis, MN 55432
612-574-5000
Telex: 275477
Fax: 612-574-8087

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